A COMPACT ELECTRICALLY AND OPTICALLY PUMPED MULTI-WAVELENGTH NANOCAVITY LASER, MODULATOR AND DETECTOR ARRAYS AND METHOD OF MAKING THE SAME

Abstract of the Disclosure

A compact, electrically and optically pumped multi-wavelength nanocavity laser, modulator and detector array uses lithography to define the precise spectral response of each element. High fields are applied within optical nanocavities to take advantage of photonic crystals filled with nonlinear materials. These nonlinearities and high fields are used to define tunable nanocavity lasers, detectors, routers, gates and spectrometers for wavelength and time division multiplexing applications. Similarly, nanofabricated optical waveguides can be used for efficient coupling of light between devices. The lithographic control over the wavelength and polarization supported within photonic crystal cavities is used to construct compact nanophotonic laser and detector arrays, and all-optical gates and routers. The photonic crystal couples light emitted by one cavity, and uses it to optically pump another with negligible diffraction losses. The emission wavelength of light from these photonic crystal lasers can be varied by simple adjustments of the lithographic pattern during their fabrication.